

Application No.: 10/588,318

Docket No.: 294695US0PCT

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(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Junichi Nakamura *et al.*

Application No.: 10/588,318

Confirmation No.: 5709

Filed: December 26, 2006

Art Unit: 1793

For: COATING, AQUEOUS COATING MATERIAL
AND PROCESS FOR PRODUCING COATING
USING THE SAME, AND COATED ARTICLE
WITH COATING

Examiner: Eli Mekhlin

DECLARATION UNDER 37 CFR §1.132

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Junichi Nakamura, declare and state that:

1. I am a citizen of Japan, residing at c/o Toyohashi Production Center, Mitsubishi Rayon Co., Ltd., 1-2, Ushikawadori 4-chome, Toyohashi-shi, Aichi 440-8601, Japan. I am currently employed by MITSUBISHI RAYON, CO., LTD., and have been engaged in research on the production of coating and aqueous coating material.

2. It is my understanding that the invention set forth in the pending claims of the above-identified patent application relates to:

(a) a coating comprising a coating component comprising a polymer; at least one kind of an anionic surfactant comprising a sulfate salt of polyoxyalkylene aryl ether, a sulfate salt of polyoxyalkylene alkylaryl ether, a formalin condensate of a sulfate salt of polyoxyalkylene aryl ether, or a formalin condensate of a sulfate salt of polyoxyalkylene alkylaryl ether, or mixtures

thereof; a nonionic surfactant; and colloidal silica having an average particle size of 60 nm or less, wherein the colloidal silica is 0.5 to 20 parts by mass in solid form for 100 parts by mass of the polymer, and an area of the colloidal silica exposed at a coating surface occupies 70% or more of the coating surface;

(b) an aqueous coating material comprising a polymer which comprises 0.1 to 20 parts by mass of a radical polymerizable monomer unit comprising a hydrolysable silyl group and 80 to 99.9 parts by mass of another copolymerizable monomer unit, wherein total contents of monomers are 100 parts by mass; at least one kind of an anionic surfactant comprising a sulfate salt of polyoxyalkylene aryl ether, a sulfate salt of polyoxyalkylene alkylaryl ether, a formalin condensate of a sulfate salt of polyoxyalkylene aryl ether, or a formalin condensate of a sulfate salt of polyoxyalkylene alkylaryl ether, or mixtures thereof; a nonionic surfactant; and colloidal silica having an average particle size of 60 nm or less, wherein the colloidal silica is 0.5 to 20 parts by mass in solid form for 100 parts by mass of the polymer;

(c) an aqueous coating material for the coating according to (a);

(d) the aqueous coating material according to (b), comprising: 0.5 to 20 parts by mass of an organic solvent having less than 0.8 of a distribution coefficient of octanol/water for 100 parts by mass of the polymer;

(e) the aqueous coating material according to (c), comprising: 0.5 to 20 parts by mass of an organic solvent having less than 0.8 of distribution coefficient of octanol/water for 100 parts by mass of the polymer;

(f) a process for producing a coating, comprising: applying the aqueous coating according to any one of (b) to (e);

(g) a coated article comprising the coating according to (a); and

(h) a coating comprising the aqueous coating material according to (b).

3. In order to demonstrate that the composition according to the present invention exhibits unexpected results, the following experiments were performed by me.

EXPERIMENTS

1. PURPOSE

The present invention discloses that a coating obtained from an aqueous coating material provided by using the combination of anionic surfactants having specific structures as claimed in claims and nonionic surfactants shows superior stain-resistance. In order to demonstrate that the stain-resistance is not developed when anionic surfactants having no specific structures as claimed in the present invention and a nonionic surfactant are used in combination, the following additional experiments were performed.

2. EXPERIMENTS AND RESULTS

(1) Production of Aqueous Coating Composition Experiment Date: September 21, 2010

[Preparation of an aqueous dispersion of a polyorgano siloxane polymer]

An aqueous dispersion of a polyorgano siloxane polymer (SiEm) was prepared according to Production Example 1 described on page 44, paragraph [0132] of the specification as originally filed.

[Preparation of Polymer (I)]

Polymers (I) of additional comparative examples 1 and 2 were prepared according to Example 2 described on pages 46 to 47, paragraphs [0139] and [0140] of the specification as originally filed. The amount of each monomer and the kind of surfactants are shown in Table 1.

Table 1

			Additional Comparative Example 1	Additional Comparative Example 2
Polymer (I)	SiEm (solid content)		0.9	0.9
	First step (inner layer)	MMA	32	32
		2-HEMA	2	2
		EDMA	0.1	0.1
	Second step (outer layer)	SZ-6030	2	2
		MAA	2	2
		AA	-	-
		2-HEMA	2	2
		n-BMA	41	41
	2-EHA	18	18	
Colloidal silica (II)		SNOWTEX N (solid content)	5	5
Surfactant	Anionic	LATEMUL E-118B (solid content)	2.75	-
		PELEX OT-P (solid content)	-	2.75
	Nonionic	EMULGEN 1150S-60 (solid content)	1	1

* Note that the following material was replaced in the experiments because the material described in the specification as originally filed was unavailable.

SNOWTEX O (particle size: 10-20 nm, solid content: 20%) was replaced with SNOWTEX N (particle size: 10-20 nm, solid content: 20%).

LATEMUL E-118B: sodium polyoxyethylene alkyl ether sulfate (which does not have an aryl part in a molecule)

PELEX OT-P: sodium dialkyl sulfosuccinate (which does not have a polyoxyethylene and aryl parts in a molecule)

(2) Preparation of Coating

The aqueous coating composition prepared by the above production method was coated on a PET film with a bar coater #60 at 40°C and was dried at 130°C for 5 minutes.

Furthermore, this aqueous coating composition was dried at room temperature for 1 day. This coating was used as a coating plate for evaluation.

(3) Measurement Method of Occupied Area of Colloidal Silica Exposed at Coating Surface

The occupied area of colloidal silica exposed at the coating surface obtained by the above process was determined by image processing of a secondary electron image of a scanning electron micrograph. The software used for the electron micrograph scan condition and image processing is shown as follows.

JSM-6340F type field emission scanning electron microscope manufactured by JEOL Ltd.

Acceleration voltage: 2.5kV

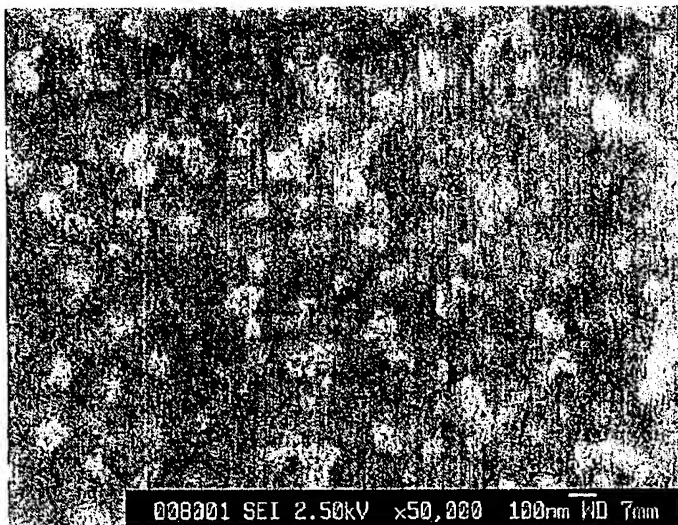
Magnification: 50,000 times / image processing analysis

Planetron Inc., Image-Pro Plus

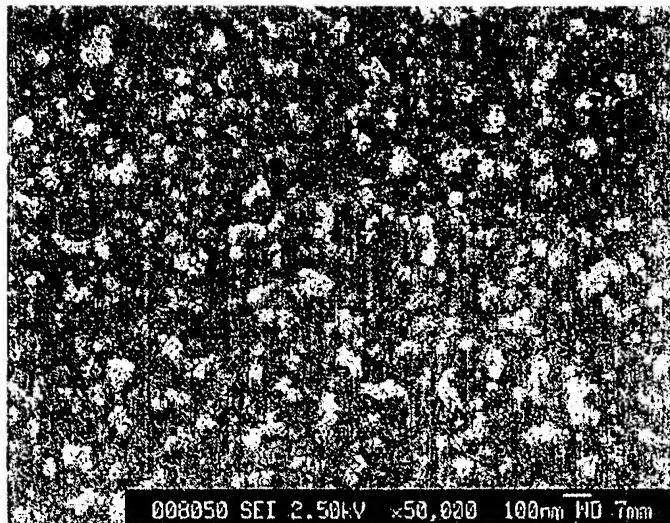
Analysis target minimal area: $1\text{e-}5\ \mu\text{m}^2$

The obtained electron micrograph is as follows.

Additional Comparative Example 1



Additional Comparative Example 2



(4) Evaluation Results

Evaluation results of additional comparative examples 1 and 2 are shown in Table 2.

Table 2

	Coating Property	Testing Results			
	Occupied areas of colloidal silica of coating surface (%)	Transparency	Water contact angle (degree)	Anti-static property (sec)	Elimination property of carbon pollution
Additional Comparative Example 1	25	Transparent	82	180 seconds or more	Thick adhesion at whole area
Additional Comparative Example 2	22	Transparent	91	180 seconds or more	Thick adhesion at whole area

In Additional Comparative Example 1 in which LATEMUL E-118B (which does not have an aryl part in a molecule) and a nonionic surfactant were used in combination, the occupied areas of colloidal silica of the coating surface was 25% and also sufficient stain-resistance (elimination property of carbon pollution) was not shown.

In Additional Comparative Example 2 in which PELEX OT-P (which does not have a polyoxyethylene and aryl parts in a molecule) and a nonionic surfactant were used in

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combination, the occupied areas of colloidal silica of the coating surface was 22% and sufficient stain-resistance (elimination property of carbon pollution) was not shown.

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For Declaration, add:

1. I am a citizen of Japan, residing at c/o Toyohashi Production Center, Mitsubishi Rayon Co., Ltd., 1-2, Ushikawadori 4-chome, Toyohashi-shi, Aichi 440-8601, Japan. I obtained a master's degree from Yokohama National University, where I studied Engineering. I am currently employed by MITSUBISHI RAYON, CO., LTD., and have been engaged in research on the production of coating and aqueous coating material since 2000.

2. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made may be punishable by fine or imprisonment, or both, and that such willful false statements may jeopardize the validity of this Application for Patent or any patent issuing thereon.

Dated: 2010.11.11

Respectfully submitted,

By Junichi Nakamura
Junichi Nakamura